

CPAT FLEX Operation Manual (ARD4/DRV1/DRV2/ITX1)



This document provides information proprietary to Effigis and cannot be used or disclosed without Effigis' written authorization.

Effigis reserves the right to make changes without notice. Changes affecting the operation of any component in this manual will be reflected in a subsequent revision. Effigis assumes no responsibility for any omissions or errors that may appear in this document or for any damages that may result from the use of information contained herein.

CPAT FLEX User Manual

First edition (v1.0): November 2011

Second edition (v1.1): November 2011

Third edition (v1.3): May 2012

Fourth edition (v1.4): July 2012

Fifth edition (v1.5): October 2012

Sixth edition (v1.6): December 2012

Part No. 9570

Published by:

Effigis

4101 Molson St., Suite 400

Montreal, Quebec

CANADA H1Y 3L1

Telephone: + 1 514 495-0018

Toll-free (North America): + 1 888 495-6577

Fax: + 1 514 495-4191

Copyright © 2012 Effigis

All rights reserved

Contents

1. General Information	4
1.1 About this Manual	4
1.2 Explanation of Symbols Used	4
1.3 Effigis Website	4
2. Product Description	5
3. System Components	6
3.1 ARD4 Module	6
3.2 DRV1 Module (optional)	11
3.3 ITX1 Module (optional)	13
3.4 DRV2 Unit (optional)	15
4. Physical Installation	17
4.1 ARD4 Module Installation	17
4.2 DRV1 Installation	22
4.3 ITX1 Installation	23
4.4 DRV2 Installation	23
5. System Operation	24
5.1 ARD4 Operation	24
5.2 DRV1 Operation	24
5.3 ITX1 Operation	25
5.4 DRV2 Operation	25
6. System Maintenance	25
6.1 Cleaning of the Equipment	25
6.2 Preventive Maintenance	25
7. Specifications	26
7.1 ARD4 Specifications	26
7.2 DRV1 Specifications	28
7.3 ITX1 Specifications	29
7.4 DRV2 Specifications	30
8. LED Status	31
9. Our Services	31
9.1 Customer Support	31
9.2 Limited Product Warranty	33

1. General Information

1.1 About this Manual

This manual describes the components, installation and operation of the CPAT FLEX ARD4, DRV1, DRV2 and ITX1 units.

You will find important safety information in this manual. We strongly recommend that all users read this manual. Use of this product other than for its intended application may compromise the unit's safety features.

1.2 Explanation of Symbols Used

The following symbols are used in this Manual :

Symbol Explanation



Direct current. (DC)



Caution. Indicates that operations or procedures, if carried out without caution, may cause personal injury or damage to the unit.



Note. Indicates additional information about the product.

1.3 Effigis Website

Effigis' website contains product specifications, information, press releases, brochure download and Frequently Asked Questions (FAQs). Please visit our website at:

<http://effigis.com>

2. Product Description

The CPAT FLEX is a modular monitoring platform that detects, records and dispatches signal leakage and ingress events in coaxial networks. The system is installed in a service vehicle and operates automatically. The CPAT platform provides web access to third party web-enabled devices or through cellular communication to upload data to a centralized CPAT web server site.

ARD4:

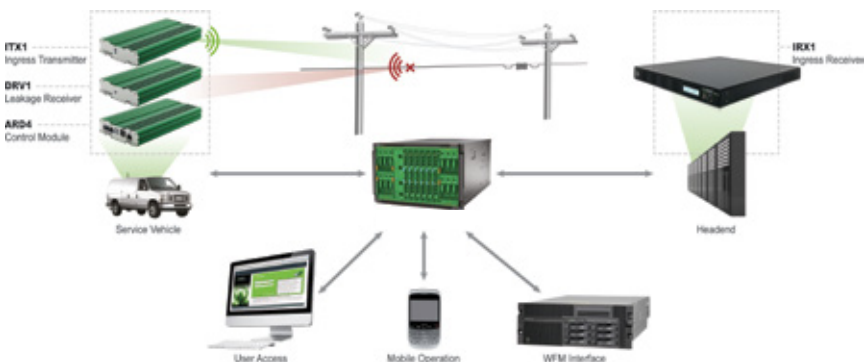
The ARD4 (Autonomous Recording Device) is the control module for the platform. It is installed in a service vehicle and is powered from the vehicle's electrical system. The ARD4 begins monitoring as soon as it is powered up and uploads data in real time back to the CPAT server, or stores the data in memory. The ARD4 can be equipped with WiFi, CDMA, GPRS and HSDPA communication modules. The ARD4 accepts other CPAT FLEX add-on modules for increased monitoring capability.

ITX1: (optional)

The ITX1 (Ingress transmitter module) is an optional module that can connect to the ARD4. The ITX1 consists of a RF digital transmitter for ingress signal monitoring purposes. The ITX1 transmits a low power signal in the 5-42 MHz band. The signal enters a coaxial network and is detected by an IRX1 receiver (not part of this evaluation).

DRV1: (optional)

The DRV1 is an optional module that can connect to the ARD4. The DRV1 is a leakage detection receiver that works with the ARD4 to automatically detect, measure and position leakage events. It operates from 110-135 MHz (Lo-band) and 118-155 MHz (Hi-band).



3. System Components

3.1 ARD4 Module

3.1.1 ARD4 Front View

P/N ARD4



ARD4 Rear View



3.1.2 DIN Rail Mounting Kit

P/N 1800



Rail Stoppers

P/N 1810



Rail Screws

P/N 1162



3.1.3 Power Cable

P/N 9245



3.1.4 WIFI Antenna

P/N 6010



3.1.5 GPS Antenna

P/N 6500



3.1.6 HSPA Antenna

P/N 6530



3.1.7 GPRS Antenna

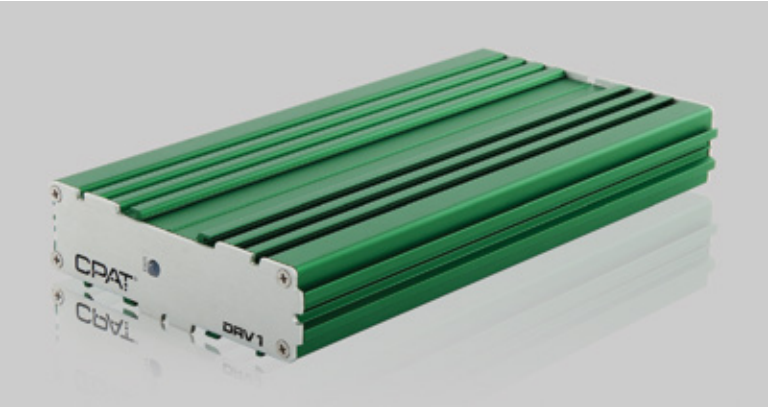
P/N 6000



3.2 DRV1 Module (optional)

3.2.1 DRV1 Front View

P/N DRV1



3.2.2 Interface Cable (4 pins connectors)

P/N 9250



3.2.3 Monopole Antenna

P/N 6400



Interconnection Screws

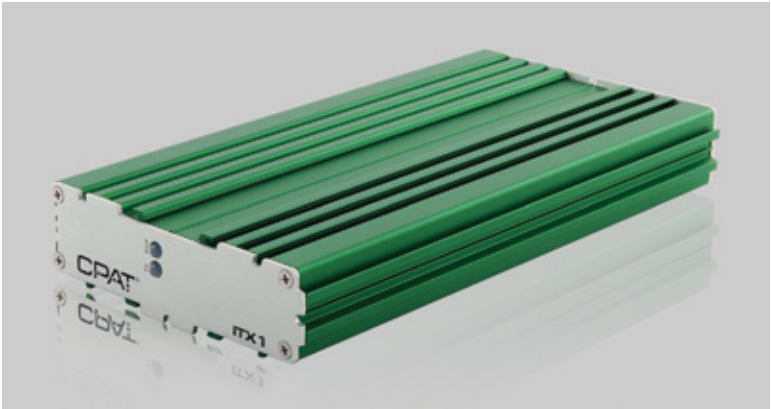
P/N 1161



3.3 ITX1 Module (optional)

3.3.1 ITX1 Front View

P/N ITX1



3.3.2 ARD4 / ITX1 Interface Cable (6 pins connectors)

P/N 9255



3.3.3 ITX1 6.78 MHz Antenna

P/N 6110



3.4 DRV2 Unit (optional)

3.4.1 DRV2 Front View

P/N DRV2



3.4.2 DRV2 USB Cable

P/N 9260

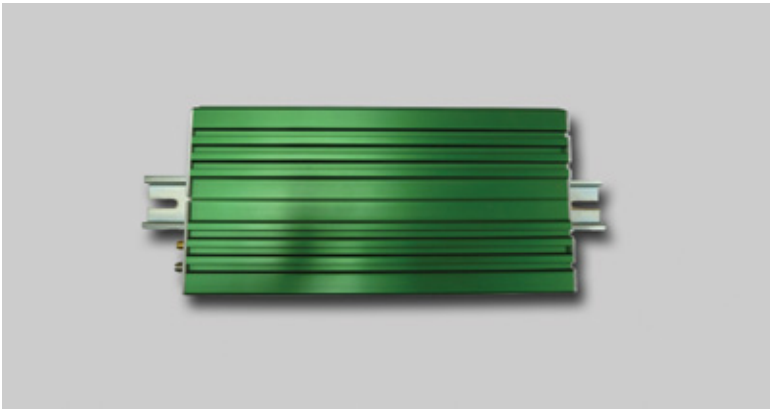


4. Physical Installation

See «Modules Physical Installation» sheet for an overview of units assembly.

4.1 ARD4 Module Installation

The ARD4 box must be installed inside the vehicle, in a place not directly exposed to the sun. The support rail must be installed using the rail screws and should be installed in a horizontal position. The ARD4 will slide into the support rail and a rail stopper will be used on each side of the unit to keep it securely in place.

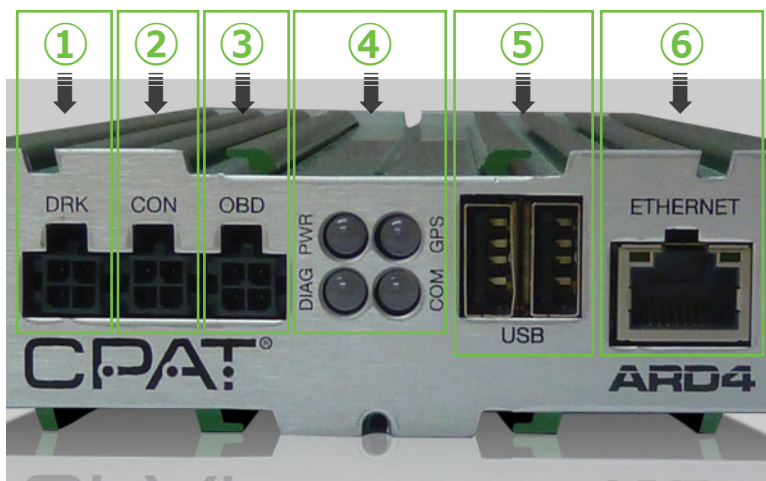


The GPS and wireless antennas location may affect the signal's integrity and should be installed on the roof on the vehicle clear of any objects.

System connectors are located on both sides of the ARD4 unit. The position of each connector, LED and slot are clearly indicated. Here is a more detailed description of their usage:

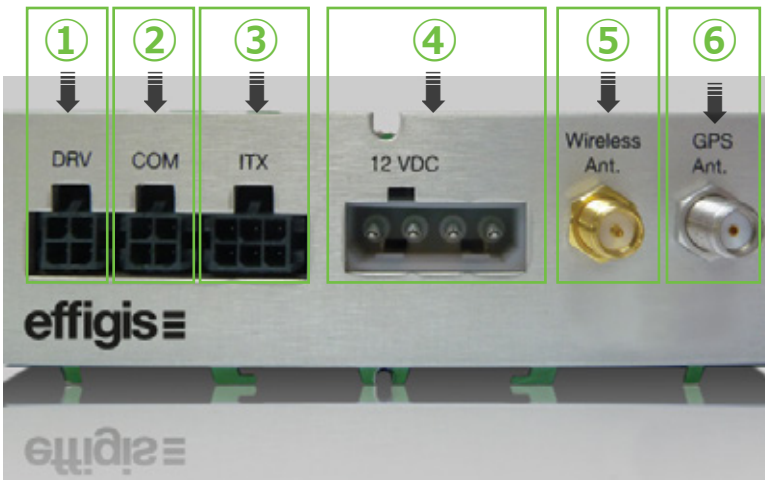
// Front panel (From left to right)

① - DRK	(Dead Reckoning)
② - CON	(Console)
③ - OBD	(On-Board Diagnostic)
④ - Status LEDs	(Power, GPS, Diagnostics, Communication)
⑤ - 2 USB Host ports	(USB type A)
⑥ - Ethernet	(RJ45 connector)



// Rear panel (From left to right)

① - DRV	(Digital Radio Effigis version 1 only)
② - COM	(Expansion for future modules)
③ - ITX	(Ingress transmitter module version 1)
④ - 12 VDC	(4 Pins Molex connector)
⑤ - Wireless Antenna	(SMA)
⑥ - GPS Antenna	(SMA)



4.1.1 Electrical Installation

The ARD4 uses two connexions to the power, a fused connexion to the car battery (12 VDC) and a connexion to the accessory circuit (switched 12VDC). This dual power connexion allows the ARD4 to complete its operations when the vehicle is shut down. After all recording and data transfer are completed, the ARD4 shuts itself off.

**CAUTION**

We recommend that the power cable be installed by qualified personnel.

Power Connections

➤ Black (Ground)

To vehicle ground (metal body).

➤ Red (Unswitched 12 VDC)

To 12 VDC electric terminal not controlled by ignition switch.

➤ Green (Switched 12 VDC)

To 12 VDC electric terminal controlled by ignition switch.

Do not to use an intermittent accessory power like heating system



CAUTION

The ARD4 must be installed on a 12V electric terminal with an inline fuse installed (5Amp).



CAUTION

Do not disconnect or modify vehicle security systems as airbags or seatbelts. Security systems wires use yellow sleeves and yellow connectors. Accidental triggering of these systems may cause severe injuries.



CAUTION

- Never install this product in places where, or in a manner that it could injure the driver or passengers if the vehicle stops suddenly.
- Never install this product in places where, or in a manner that it may interfere with the driver's operation of the vehicle, such as on the floor in front of the driver's seat, or close to the steering wheel or shift lever.
- Make sure there is nothing behind the dashboard or paneling when drilling holes in them. Be careful not to damage fuel lines, brake lines, electronic components, communication wires or power cables.
- When using screws, do not allow them to come into contact with any electrical lead. Vibration may damage wires or insulation, leading to a short circuit or other damage to the vehicle.
- To ensure proper installation, use the supplied parts in the manner specified. If any parts other than the supplied ones are used, they may damage internal parts of this product or they may work loose and the product may become detached.
- It is extremely dangerous to allow the cables to become wound around the steering column or shift lever. Be sure to install this product, its cables, and wiring away in such a way that they will not obstruct or hinder driving.
- Make sure that leads cannot get caught in a door or the sliding mechanism of a seat, resulting in a short circuit.
- Please confirm the proper function of your vehicle's other equipment following installation of the navigation system.
- Do not install this system where it may (i) obstruct the driver's vision, (ii) impair the performance of any of the vehicle's operating systems or safety features, including airbags, hazard lamp buttons or (iii) impair the driver's ability to safely operate the vehicle.
- Never install the system in front of or next to the place in the dash, door, or pillar from which one of your vehicle's airbags would deploy. Please refer to your vehicle's owner's manual for reference to the deployment area of the frontal airbags.
- Do not install the system in a place where it will impair the performance of any of the vehicle's operating systems, including airbags and headrests.

4.1.2 Antennas Installation

The ARD4 comes with two modules, a wireless one chosen by the customer (WIFI or cellular) and a GPS one. Both the GPS and WIFI (or Cell) antennas must be connected to the ARD4 in order to maximize sky visibility and data transfer.

4.1.3 Dead Reckoning Installation

The DRK cable is used only with the dead reckoning option.

Green (Speed Signal)

To vehicle speed detection circuit lead coming out of the injection computer.

Brown (Reverse Signal)

To vehicle backup light lead.

4.1.4 On-Board Diagnostic Installation (optional module)

Not available yet.

4.2 DRV1 Installation

The DRV1 slides into the ARD4 and a screw is used on both sides to hold the two units in place.

The wire coming out of the DRV1 connects to the DRV connector on the ARD4. (Shown are the way to slide a DRV1 into an ARD4 and the two units screwed together)



NOTE

The DRV1 unit can also be tied to the ARD4 unit by joining them side-to-side. The monopole antenna must be connected to the TNC connector of the DRV1.

4.3 ITX1 Installation

(Similar to DRV1)

The ITX1 module will slide on top of the DRV1 (which is on top of the ARD4) module and a screw on each side will be used to hold the two units in place. From the ITX1, the interface cable will be connected to the ARD4 ITX plug. The 6.78 MHz whip antenna will be connected to the ITX1.

4.4 DRV2 Installation

When used with an ARD4, the DRV2 will connect to it using the USB connector. In this mode the user will view RF level of the fault found on the DRV2 screen.

See user guide manual (Leakage Detector Operation Manual) for more information regarding the DRV2 standalone installation.



NOTES CONFIGURE

- You must quit all DRV2 settings before connecting it to the ARD4.
- As soon as the DRV2 is plugged and the ARD4 PWR LED indicator is green, the ARD4 will take full possession of the DRV2's functionalities and DRV2 menu should not be accessed.
- Be sure that the antenna selection is correct in the DRV2's menu before plugging it to the ARD4.
- You can plug the DRV2 to the ARD4 even if it is powered OFF.

5. System Operation

5.1 ARD4 Operation

5.1.1 Startup

When the vehicle starts, the ARD4 turns on automatically. The ARD4 PWR LED stays red until the system has completely finished its boot process. When the boot process has ended the PWR LED becomes green.

5.1.2 GPS

The ARD4 GPS LED stays OFF during the boot process. The LED is red when there is no valid information coming from the GPS and green when there is valid data.

5.1.3 Communication

The ARD4 tries to access the wireless network at startup in order to get its new configuration files, and upload remaining data files that have not yet been transferred. When this is done, it enters in transfer mode and simply tries to upload data files at configurable time interval. During each file transfer the COM LED becomes green. If any error occurs during a transfer this indicator becomes red for 1 second.

5.1.4 Shutdown

When the user turns off the vehicle, the ARD4 enters automatically into shutdown mode. It then tries to upload all remaining data files for 60 seconds and then shuts itself off. If the car is turned back ON, during this time the system stays ON and reopens a new data file.

5.2 DRV1 Operation

5.2.1 Leakage Detection

For any valid leakage detections the DIAG LED becomes green until the leakage becomes undetected.

5.3 ITX1 Operation

5.3.1 Booting

When the ITX1 is booting, the PWR LED is flashing red and the Tx LED will flash orange few seconds after. The booting process usually takes no longer than 5 seconds.

5.3.2 Normal Operation

When the device is powered ON, the PWR LED is solid green. The Tx LED indicator on the ITX1 will flash upon every successful GPS point transfer from the ARD4.

5.4 DRV2 Operation

5.4.1 Antenna Selection

Since the ARD4 does not know which antenna is connected to the DRV2, you must configure this option in the DRV2's menu while it is disconnected from the ARD4. See DRV2 operating manual for antenna configuration.

5.4.2 USB Hotplug

All DRV2 functional parameters are automatically applied by the ARD4 (operating frequency and operating mode) once plugged to it.

*** Very important - Do not access DRV2's menu while it is communicating with ARD4. Unplug it if you have to do so.

6. System Maintenance

6.1 Cleaning of the Equipment

Your CPAT FLEX unit can be wiped clean with a damp cloth. Do not immerse the unit in water. Avoid solvents and commercial cleaners.

6.2 Preventative Maintenance

The technician shall do periodic visual inspections on the RF connections and antennas to make sure that there is nothing loose and that there is no rust. Both can affect the performance of the system. Periodic inspection on the power cable shall be done to ensure that the insulation is intact.

In case that a replacement is required, please contact Effigis for more information.

7. Specifications

7.1 ARD4 Specifications

// System

CPU	ARM9 (NXP) Model LPC3240
Operating system	Linux 2.6
Memory	SDRAM: 64 MB, NAND Flash: 64 MB
Power	12 VDC, 1 Amp Max
Wireless modem modules	WiFi 802.11b-g, GPRS, CDMA, HSDPA
GPS module	uBlox LEA-6x

// Physical

Dimensions	3.3 cm x 11.2 cm x 22.3 cm / 1.3" x 4.4" x 8.8" [H x W x D]
Weight	652 grams / 23 ounces
Operating temperature	-20° to + 60° C / -4° to + 140° F

// External I/O Connectors

Communication port	2 USB serial ports (host)
Proprietary connectors	1 connector for each of the following: ITX1, DRV1, Dead-Reckoning and OBD-II modules 1 connector for each of the following: GPS and wireless communication module antennas
Network connector	RJ-45 10 Base-T Ethernet connector
Serial connector	1 connector (client interface)

// LED Indicators

GPS Status LED	'Blanked' during GPS initialization, 'red' when invalid GPS position and 'green' when valid GPS position
Wireless Communication LED	'Green' when uploading/downloading to a wireless cellular infrastructure, blinks 'red' if error during transmission and 'off' when module is not connected to network
Power LED	'Red' when booting, 'green' when on, 'red' on error and 'off' when power off
Diag LED	Flashing 'Green' when leakage is detected

// Protocol

Protocols	IP, FTP
------------------	---------

// Wireless Security

Supported encryption	WEP, WPA (TKIP) and WPA 2 (AES)
-----------------------------	---------------------------------

7.2 DRV1 Specifications

// Electrical

Detector type	Digital receiver/demodulator
Frequency range	Agile 110 to 135 MHz (Lo-band version) Agile 118 to 155 MHz (Hi-band version)
Tuning resolution	1 kHz
Equivalent resolution bandwidth	4 kHz
Level range	2 to 2,000 uV/m
Level Accuracy	± 1 dB
Tag detector	AM [3 to 20 Hz] – FM [3 to 20 Hz]
Video detector	Video sync detection [untagged video carriers]
Power	12 VDC, 400 mA
Communication port	Serial port

// Physical

Dimensions	3.3 cm x 11.2 cm x 22,3 cm / 1.3" x 4.4" x 8.8" [H x W x D]
Weight	652 grams / 23 ounces
Operating temperature	-20° to + 60° C / -4° to + 140° F

7.3 ITX1 Specifications

// Electrical

Operating frequency selection/Bandwidth	6.78 MHz: 30 kHz
TX antenna	Monopole (42 Inches)
Antenna gain	-27 dBi
Radiated power@ 6.78 MHz	-8 dBm
Transmitted data	68 bits
Transmission duration	8 ms
Data repetition rate	10 times/sec
Communication port	6 pin compatible with ARD4
Power	12 VDC, 500mA

// Physical

Dimensions	3.4 cm x 10.8 cm x 22 cm/1.32" x 4.27" x 8.66" (H x W x D)
Operating temperature	-20° to + 60° C/-4° + 140° F

7.4 DRV2 Specifications

// Electrical

Detector type	Digital receiver/demodulator
Frequency range	Agile 110 to 135 MHz (Lo-band version) Agile 118 to 155 MHz (Hi-band version)
Channel tuning	Configurable via USB port and by front panel buttons with 10 presets
Tuning resolution	1 kHz
Equivalent resolution bandwidth	± 4 kHz
Level range	2 to 2,000 uV/m
Level accuracy	± 1 dB
Tag detector	AM [3 to 20 Hz] – FM [3 to 20 Hz]
Video detector	Video sync detection [untagged video carriers]
Audible tone	Yes, varies with leak intensity
Adjustable audio volume	Yes, variable
RF level scale display	Unique scale from 0 to 2,000 uV/m
Measurement units	uV/m and dBuV/m
Power	Pack of 3 rechargeable AA NiMH cells, 2,500 mAh
Power (not in charge)	12 VDC, 140 mA
Charging power	12 VDC, 1000 mA
Operation time	8 hours nominal
Communication port	USB serial port

// Physical

Dimensions	17.7 cm x 8.6 cm x 3.3 cm / 7" x 3.4" x 1.3" [H x W x D]
Weight	396 grams / 14 ounces

8. LED Status

// System State	// LED State
Startup	PWR LED is red and all others are OFF
Normal operation mode	PWR LED is green
Bad or no GPS signal detected	GPS LED is red
Valid GPS signal	GPS LED is green
Communicating (Wifi or GPRS)	COM LED is green during transfer
Error during file transfer	COM LED is red for 1 second
DRV leakage found	DIAG LED is flashing green during leakage detection

9. Our Services

Effigis offers a portfolio of services to deploy and support purchased equipment through its Customer Support organization. Customer Support is standard with every product sale and consists of technical assistance, in-warranty repair and calibration.

9.1 Customer Support

Customer Support services include:

- Product and Service Literature
- Technical Assistance
- Equipment Repair (Under Warranty Repair and Calibration Services)
- Equipment Return Authorizations

Contact a Customer Support representative through your local distributor or by accessing <http://effigis.com> for information on calibration and warranty policies.

Effigis Technical Support Service is available from Monday through Friday from 9:00 AM to 5:00 PM Eastern Time.

Toll free from U.S. and Canada: + 1 888 495-6577

International: + 1 514 495-0018

Fax questions anytime to: + 1 514 495-4191

9.1.1 Equipment Return AUTHORIZATION

Please contact your local Customer Support location for Return Authorization to accompany your equipment. For each piece of equipment returned for repair, attach a tag that includes the following information:

- Owner's name, address, and telephone number
- The serial number, product type, and model
- Warranty status (If you are unsure of the warranty status of your instrument, contact Effigis' Customer Support.)
- A detailed description of the problem or service requested
- The name and telephone number of the person to contact regarding questions about the repair
- The return authorization manufacturer (RMA) number

If possible, return the equipment using the original shipping container and material. If the original container is not available, the unit should be carefully packed so that it will not be damaged in transit; when needed, appropriate packing materials can be obtained by contacting Effigis Customer Support. Effigis is not liable for any damage that may occur during shipping. The customer should clearly mark the Effigis' issued RMA or reference number on the outside of the package and ship it prepaid and insured to Effigis.

Equipment repaired or replaced under warranty will be returned at Effigis' expense to Customer (Canada/USA) or Effigis' representative (all other countries).

All other non-warranty repairs will be returned at Customer's expense to Customer (Canada/USA) or Effigis' representative (all other countries).

9.2 Limited Product Warranty

9.2.1 Hardware

Effigis warrants to the original end user (Customer) that any new Effigis branded products will be free from defects in workmanship and materials, under normal use, for one (1) year from the date of original shipment.

Effigis warrants repaired products for ninety (90) days from date of shipment. Any Product repaired or replaced under warranty is only warranted for the period of time remaining in the original warranty for the Product.

Any third party products, including software included with Effigis products, are not covered by this Effigis warranty and Effigis makes no representations or warranties on behalf of such third parties. Any warranty on such products is from the supplier or licensor of the product.

9.2.2 Software

Effigis warrants to the Customer that new Effigis branded software and firmware will perform in substantial conformance to program specifications for a period of ninety (90) days from the date of original shipment. Effigis warrants the media containing software against failure during the warranty period.

Effigis makes no warranty or representation that the operation of the software products will be uninterrupted or error free, or that all defects in the software products will be corrected.

9.2.3 Exclusions

This warranty excludes:

- Damage to the physical surface of the product, including cracks or scratches to any part.
- Damage caused by misuse, neglect, improper installation or testing, unauthorized attempts to open, repair, or modify the product, or any other cause beyond the range of the intended use.
- Use of the product with any non-recommended device or service if such device or service causes the problem.
- Installation or maintenance of Product by someone other than Effigis or persons certified by Effigis.

- Changes to the Customer environment in which Product was installed.
- Damage caused by accident, fire, power changes, other hazards, or acts of nature.
- Consumable Product or parts thereof (e.g., parts with an expected useful life of less than ninety (90) days, such as certain batteries).
- Product not returned in accordance with Effigis' RA procedure.

9.2.4 Refurbished Parts and Prior Testing

Product may incorporate reconditioned or refurbished parts or subassemblies and may have been used in testing prior to sale.

9.2.5 Exclusive Remedies

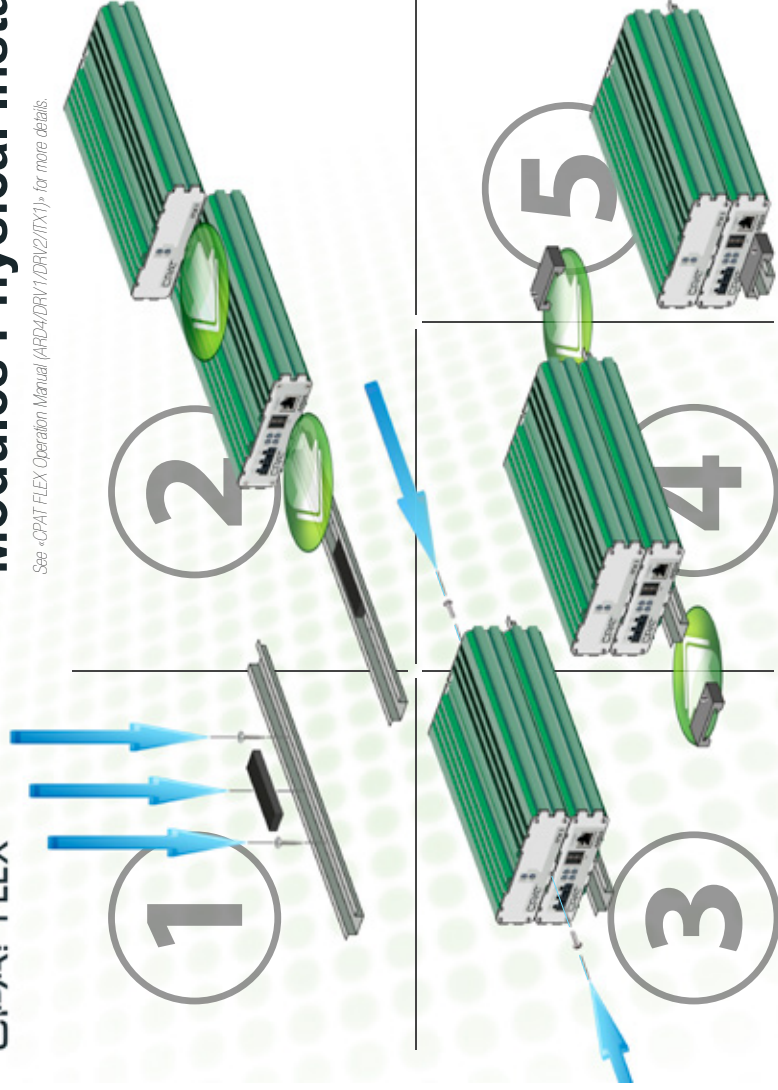
If any Product materially fails to conform to the limited warranty set forth in this Section (Limited Warranty) and actually fails during the applicable warranty period and under normal use, Effigis shall, at its sole discretion (i) repair or replace the non-conforming Product to remedy the nonconformity identified by Customer in accordance with this Section (Limited Product Warranty); or (ii) issue a credit to Customer for the amounts paid for the Product in exchange for return of the non-conforming Product, in which case Customer's licenses to any Firmware shall be automatically revoked. Customer hereby transfers to Effigis title and ownership of any parts that Effigis replaces.

9.2.6 Disclaimer

THE REMEDIES EXPRESSLY PROVIDED IN THIS SECTION WILL BE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES AND SHALL BE IN LIEU OF ANY OTHER RIGHTS OR REMEDIES CUSTOMER MAY HAVE AGAINST EFFIGIS WITH RESPECT TO ANY NON-CONFORMANCE OF PRODUCTS. EXCEPT AS SPECIFIED IN THIS LIMITED PRODUCT WARRANTY, EFFIGIS MAKES NO EXPRESS REPRESENTATIONS OR WARRANTIES WITH REGARD TO ANY PRODUCT. EFFIGIS DISCLAIMS ALL IMPLIED WARRANTIES, CONDITIONS, AND REPRESENTATIONS INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OR CONDITIONS OF MERCHANTABILITY, SATISFACTORY QUALITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT, REGARDLESS OF THE LEGAL THEORY ON WHICH SUCH IMPLIED WARRANTY MAY BE BASED, INCLUDING, WITHOUT LIMITATION, CONTRACT, COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

Modules Physical Installation

See «CPAT FLEX Operation Manual (ARD4/DRV1/DRV2/ITX1)» for more details.





effigis.com

1.888.495.6577